

**Departmental Syllabus**  
**Math 4430 -- Advanced Calculus**

**Textbook:** Introduction to Analysis (Fifth Edition) by Edward Gaughan

**Prerequisites:** MATH 2840 with a grade of "C" or better

**Calculators:** No specific calculator required.

**Course Description:** Study, through formal proof, of sequences, limits, continuity, differentiation, integration, infinite series, and uniform convergence.

**Topics and sections to be covered:**

- 0.1 Sets
- 0.2 Relations and Functions
- 0.3 Mathematical Induction and Recursion
- 0.4 Equivalent and Countable Sets
- 0.5 Real Numbers
  
- 1.1 Sequences and Convergence
- 1.2 Cauchy Sequences
- 1.3 Arithmetic Operations on Sequences
- 1.4 Subsequences and Monotone Sequences
  
- 2.1 Definition of the Limit of a Function
- 2.2 Limits of Functions and Sequences
- 2.3 Algebra of Limits
- 2.4 Limits of Monotone Functions
  
- 3.1 Continuity of a Function at a Point
- 3.2 Algebra of Continuous Functions
- 3.3 Uniform Continuity: Open, Closed, and Compact Sets
- 3.4 Properties of Continuous Functions
  
- 4.1 The Derivative of a Function
- 4.2 The Algebra of Derivatives
- 4.3 Rolle's Theorem and the Mean Value Theorem
- 4.4 L'Hospital's Rule and the Inverse-Function Theorem
  
- 5.1 The Riemann Integral
- 5.2 Classes of Integrable Functions
- 5.3 Riemann Sums
- 5.4 The Fundamental Theorem of Integral Calculus
- 5.5 Algebra of Integrable Functions

## 5.6 Derivatives of Integrals